OCCUPATIONAL INJURIES AND DISEASES IN ALBERTA

Upstream Oil and Gas 1995 to 1999

Lost-Time Claims and Claim Rates

Alberta
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1. Introduction

The Mission of Alberta Human Resources and Employment

One of the missions of Alberta Human Resources and Employment is to work in partnership with Albertans to promote safe and healthy workplace, a quality working life and comprehensive safety systems. To this end, Alberta Human Resources and Employment recognises that monitoring health and safety in Alberta will help to ensure primary workplace health and safety concerns are actively managed and prioritised, and resources directed where most needed.

This report summarises the lost-time injuries and disease descriptions, characteristics of the injured worker and the risk of injury to workers in Alberta's upstream oil and gas industries for the years 1995 to 1999. Cost of the injuries and revenue in terms of total premiums and the number of employers that received a Certificate of Recognition (COR) as a result of an external audit are also presented. Finally, a summary of occupational fatalities accepted by the WCB for compensation and brief descriptions of fatalities investigated by Occupational Health and Safety (OHS) are also provided.

The purpose of this report is to provide government, employers, workers, and health and safety officers in upstream oil and gas industries with information about the industry key health and safety issues.

Description of Upstream Oil and Gas Industries

The upstream oil and gas industries can be subdivided into the following sub-sectors.
Exploration, Oilfield Maintenance and Construction, Well Servicing with Service Rigs and Power Swivels, Drilling of Oil and Gas Wells, Oilfield Downhole and Other Services, Tar Sands, Petroleum Producers, and Oilfield Trucking Services.

The next section gives the descriptions of the sub-sectors.

2. Sector Descriptions

Sub-Sector # 1: Exploration

i. Seismic Geophysical/Mineral Exploration (Industry # 09200)

This industry involves conducting exploration using seismic technology for the purpose of locating formations beneath the earth's surface that may produce usable minerals such as coal, or oil and gas.

The basic procedure used to locate favorable formation beneath the earth's surface is to send shock waves into the ground, and record the patterns on seismic recording equipment.

When exploring for oil and gas, any one of the following three methods may be employed to create the shock waves:

1. Seismographic - Dynamite exploded in a shot hole;
2. Vibraseismic - tractor or truck mounted vibrators which are released to the ground at certain points; and
3. Vacuum Guns - truck mounted piston strikes base plate to send shock waves through the ground

When exploring for minerals, such as coal, shock waves are created by means of small hand tools. Larger equipment is not required as minerals formations are generally not located as deep below the surface as are oil and gas.

Sound waves are received through instrument referred to as geophones. The geophones are in turn wired to recording instruments that log the sound wave patterns. The data processing and analysis of the obtained information, may or may not, be part of the contract.

This industry does not cover shot hole drilling. This is normally subcontracted out to another company classified in industry 09201. Should an employer conduct drilling in conjunction with exploration, an additional industry is required.

Geophysical Exploration, other than seismic, is classified in industry 86405. The key difference is the generation and recording shock waves.

ii. Shot Hole Drilling (Industry # 09201)

The purpose of this industry is to drill bore holes for the purpose of holding explosives used in seismic exploration activities.

Shot hole drilling is performed with a small truck-mounted driller. This is normally a shallow drilling operation, drilling to a depth of 50 to 75 feet. This activity involves drilling only, as an exploration crew is responsible for placing and discharging the explosives. When the explosives are discharged or shot, the vibrations are recorded on a seismograph.

Sub-Sector # 2: Oilfield Maintenance & Construction

Oilfield Construction and/or Maintenance (Upstream of Processing Plants)(Industry # 06304)
This classification describes general contracting business that undertake turn-key construction and maintenance projects at facilities and lease sites upstream of gas plants.

Businesses may construct oil and gas wells, battery tanks, and compressor stations upstream of the processing facility. Construction activities may extend into ties-ins, installing/removing pumpjacks, dehydrators, and secondary construction activities of installing fences and gates. Maintenance activities may include painting, welding, pipefitting, cleaning oil spills, clearing a lease road, and maintaining the grounds in and around the site.

Sub-Sector # 3 : Well Servicing With Service Rigs Including Power Swivels

Oil well servicing by means of service rigs including power swivels (Industry # 09903)
This industry is used to cover oil and gas well servicing operations which are conducted with the use of well servicing rigs. Service rigs can be used on well completions once drilling operations have been completed to bring a producing well on stream as well as work over service to existing oil and gas wells. This industry is also used to cover the operation of power swivels used to replace working components of service rigs and work over units.

Service rigs are smaller and more mobile than drilling rigs, (smaller to a large mobile crane) and usually truck mounted. A service rig operator, derrick hand and two floor hands usually make up a service rig crew. Most service rig operators will have shop operations for structural and mechanical repair on their rigs.

Power Swivels are hydraulic motor driven pipe rotating machines specifically intended to replace the drilling swivels, the kelly stem, the kelly bushing and the rotary table on service rigs and work over units. They are trailer mounted and completely portable. Power swivel can be used to provide rotary power for the internal cutting of casing, drill pipe and tubing for drilling out packers, plugs, cement and other obstructions, for milling and scraping, drilling short distances, coring and as a utility tool in fishing operations.

Sub-Sector # 4: Drilling of oil and gas wells

Drilling of oil and gas well (Industry # 9600)
Oil well drilling is performed by independent drilling companies contracted directly to oil companies. Oil companies will coordinate the drilling program and may provide on site direction and supervision, but do not become physically involved in operating the drilling rig.

The drilling of gas and oil wells is carried out by small crew, including a rig manager (tool push), driller, derrick hand, motor hand, floor hands (roughneck) and lease hands. Drilling can be round-the-clock operations using shift workers.
The drilling of gas and oil wells involves the use of large heavy duty rigs or derricks that may be capable of drilling several thousand feet into the earth. The equipment is set up at a predetermined location and drilling commences for two to four weeks. Considerable time is spent setting up the equipment; however, this is considered part of the drilling operations. Also included is the activity of levelling the drilling rig. This involves the use of heavy hydraulic jacks (50 to 100 tons) to raise or lower the oil derrick prior to drilling. Heavy timbers are used to stabilize where necessary. Due to tremendous torque or twisting pressure exerted by the drill stem, it is necessary that the rig be level.

Blowout control and well fire fighting are also in this industry. The procedure necessary to cap a wildcat well varies. Sometimes a blowout cab be brought under control by pumping mud or cement to stop the flow, or replacing valves on the blowout preventer. If a well catches fire, the fire must be extinguished before the well can be capped. A common method is to use explosives to cut off the fire's oxygen supply. Employers that are hired to set explosives for this purpose are covered in this industry.

Sub-Sector # 5: Downhole & Other Oilfield Services

i. ***Field Production Operators (Industry # 06305)***

This industry covers the 'contract' operation of upstream oil and gas production/processing facilities not classified elsewhere. This is primarily a labor service contracted to oil and gas producers for the routine day to day operation of facilities such as those described in industry 6300, including the operation of gas plants.

This is normally a daily responsibility. The duties of oil field production or gas well and battery operators will vary with different companies. Some may only be responsible for checking wellhead equipment. Others may work entirely at the battery and a majority of operators look after both wellhead and battery. If enhanced recovery methods are used on the well, Field Production Operators may operate these units in addition to their other duties.

Duties also include taking pressure and flow reading at the oil well, seeing equipment is running properly, checking flow lines, reading meters, looking for leaks, and may also involve working at the treater plant where samples may be required and reading needed on the levels of oil, gas, water and the addition of chemicals to the unit. At the water disposal unit, meters and gauges are checked, which measure pressure and water capacity levels to ensure there is sufficient space to hold the water coming in from the treating unit. At oil storage tanks, operators check pressure, storage capabilities and levels of the tanks. When gas is involved operators check the Christmas tree which controls the flow and pressure of the well. They inspect valves, take readings of gauges, temperature, pressure and flow rate.
The operators and their helpers are responsible for routine maintenance and light housekeeping duties only when a condition of the contract to operate the facility.

ii. Vacuum Removal-Industrial, Commercial, and Oil Field(industry # 06306)

This industry includes the vacuum truck removal or recovery of industrial by-products, pollutants, hydrocarbons, toxic waste and other liquid waste from oil wells, gas wells, refineries, heavy oil extraction plants, chemical plants and other industrial plants sites. It also includes the cleaning up of fertilizer, grain, sulphur and other dry waste products from industrial and commercial sites such as elevators and rail car derailment sites. Septic tanks and farm waste removal is also part of this industry.

Equipment used ranges in size from a single axle truck with small tank storage and moderate pumping power, to tandem and larger trucks with larger tank capacity and powerful pumping units.

The major feature of this industry is to recover and remove products from an employer's work site. The transportation of the product is an integral part of the services provided.

This industry includes hydro-trenching/hydro-excavating where water is applied under pressure to the ground creating a mud/slurry which is simultaneously vacuumed up by a truck, equipped with both vacuum and water ejection apparatus and holding tank.

The purpose is to expose pipe/utilities for further trenching and excavating without causing pipe ruptures.

iii. Mud Logging (Industry # 09900)

Employers engaged in hydrocarbon well/mud logging are included in this industry. Hydrocarbon well/mud logging is a procedure used in oil field drilling to log the strata and other pertinent details on a well during the drilling process.

Drilling mud is a mixture of pulverized barite, clays, chemicals and other various substances. Mud tanks and pumps are used to circulate the mud down the well bore during drilling operation. In addition to bringing cuttings to the surface, drilling mud cools and lubricates the bit and drill stem, protect against blowouts by holding back subsurface pressures, and deposits a mud cake on the wall of the borehole to prevent loss of fluids to the formation

A geological technician sets up at the drill site. Samples of drill cutting and gas, entrapped in the mud, are analyzed and the data recorded. They also analyze drill bit performance, rate of penetration and other information related to the drilling operations as required by the oil company. Log data and details are turned over to the oil companies for further study, and decisions concerning the drilling operations are made.
Equipment used to conduct the analysis includes chromatographs, total gas analyzers, U.V. box and microscopes.

iv. Pressure Cleaning Services (Industry # 09902)

These are mobile cleaning services conducted with the use of truck-mounted tanks equipped with pressure pumps that eject water, steam, air or hot oil for industrial, commercial or oilfield cleaning purpose.

Industrial and commercial applications will be cleaning of dirt, oil, grease or debris from anything ranging from buildings and plant equipment to rail cars and mobile equipment as well as flushing sewers and drains.
In the oil field, high pressure air, water or steam is used to remove sand, wax and other debris from well site production equipment and storage tanks. This industry also covers pressure services using steam and hot oil treatments to clean paraffin from well casing and includes flush by services where truck mounted masts are used to lift sucker rods to allow a flush of the well.

Hot oil, water and steam treatments can be used for thawing of oil field equipment, storage tanks as well as pipe lines, water and sewer lines.

v. Rathole Drilling And Service Rig Anchoring (Industry # 09904)

Prior to setting up a drilling rig to drill oil and gas wells it is necessary to drill a starter or conductor hole as well as holes for pipe stands known as rat and mouse holes. This is done with truck mounted drilling rigs. This industry is also used to cover the rig anchoring operations which install ground anchors primarily to secure service rigs during operations and also to secure flare stacks.

The oil company, or contractor arranges site survey and access to the area, and indicates where the holes are to be drilled. Unlike drilling or service rigs, where sections of the drill stem are used, a one piece truck mounted auger is used in these operations. Three holes are drilled from 16 to 36 inches in diameter depending on requirements.

A conductor hole is drilled to a depth of 30 to 40 feet (the deepest may be 60 feet, but this is rare). A 16 or 19 inch pipe, or casing is put into the hole and cemented around the outside to hold it in place. The conductor hole is the main drill hole that the drilling rigs start their drilling operations in.

Rig anchoring services are completed with the use of truck mounted equipment, which will screw an auger type piece of iron into the ground until solid base is reached. The anchor is pull tested at 15 to 20,000 lbs. Safety cables are then used to secure service rigs or flare stacks to the anchors. Anchoring companies do not usually fasten the cables.

vi. Oil field Downhole Services (Industry # 09911)

This industry covers a wide spectrum of oilfield downhole services related to well completion, stimulation, testing and wireline services. This industry does not cover well servicing operations with the use of well servicing rigs. Employers in this industry usually offer a multitude of the above service to their clients with a variety of equipment, down hole tools and truck mounted units.

Services in this industry can include:

Directional drilling services involve only the supply of equipment and specialized supervision to the oil company. This work is done during the drilling process with the physical work or actual drilling done by the drilling crew.

Wireline services involve lowering special instruments into the well for testing purpose. A wireline may also be used to pull instrument or scrape debris out of the well.

Oil and gas well perforating involves lowering explosive device into the well on a wire line. When the required depth is reached, the device is detonated by an electric current. The explosive perforates the well casing, allowing the flow of oil at different levels.

Well testing activities include testing production levels. Production testing is performed by compressor equipment, usually truck mounted, which introduces water, air, or nitrogen into the line under high pressure and records information on pressure instruments. A separator may also be used to test flow or proportion of gas/oil and water in the flow.
Smaller hand held recording instruments may also be used for testing purposes. Dynamometers are surface instrument used to test downhole pumps and pump jack performance. Echometers are a downhole instrument used to log fluid levels and require the discharge of blank shell to generate shock waves which are then recorded.

After a shot hole has been drilled, the hole is usually never used again and must be closed for environmental reasons. Shot hole cementers place a plug part way down the hole, then fill the hole with cement from the plug to the surface. *Cementing* also involves pumping cement downhole to secure the well casing.

Fracturing is the process of forcing, under high pressure, a mud-sand slurry with carbon dioxide or nitrogen to expand or fracture the formation, allowing the oil or gas to escape the well.

Chemical treatment involve forcing/injecting stimulation fluids into the well casing to clear contaminants, remove paraffin and hydrates for well stimulation.

Under balanced drilling is a down hole process where lighter drilling fluids are used to lubricate the drilling bit and drill stem. The purpose of this process is to reduce cost and reduce the need for well stimulation in completing the well.

vii. Well Casing Services (Industry # 09915)

This industry is intended to cover those employers who engage in a variety of services related functions on

active drilling rigs.
Employers classified in this industry may engage in any one or more of the following activities:

Oil and Gas Well Power Tong Operations: Involves the use of large truck mounted hydraulic tongs to screw together or break apart sections of pipe (or casing) when being placed in, or removed from the drill hole.

Hydraulically operated Snubbing Units: units are truck mounted and are used to move tubular products in and out of the oil or gas well which has pressure at the surface ('live well'). There is a hydraulic jack which clamps on to the pipe to control and overcome the forces on the tubular goods exerted by the well bore pressure. By moving the jack up and down, and releasing and resetting the clamps, the tubulars can be put into or removed from the well bore. The second part of the Snubbing Units are the blow-out preventers which are also hydraulically operated and are used to control the pressure on the well. Snubbing services are used primarily in work overs and well completions; however, drilling contractors may also require their services.

Cleaning of Pipe Threads at Well Site: prior to the casing being placed in the well hole, the pipe threads must be cleaned. Well casing crews clean the pipe threads using varsol, wire brushes and rags.

Transport Pipe at Drill Site: Pipe (or casing), found on a pipe rack approx. 100 feet away from the drilling rig, is transported to the rig floor by a carrier suspended on a wire cable running from a winch permanently mounted on a truck. These units used to transport the pipe are referred to as pickup/lay down units.

Torque Monitoring: using a gauge or a computer monitoring system the amount of torque applied when joining two joints of pipe together by means of power tong is monitored and controlled.

Employers that install blow-out preventers are also included in this industry.

viii. Servicing Christmas Trees on Oil Wells by Means of a Tree Saver (Industry # 09921)

An oil well 'Christmas tree' is a series of pipes and valves that are situated on the well head after drilling of the well has been completed. This equipment need to be protected when fracturing a well.

The tree saver is a heavy gauged piece of pipe (approximately 2 metres long, 5 centimetres in diameter and weighs 90 kilograms), which is inserted through the Christmas tree and into the well tubing to prevent the fracturing fluid from wearing away at the valves and parts of the Christmas tree. The saver is held in place by means of a bolted coupling and rubber sleeve.

ix. Liquid Waste Treatment & Disposal (industry # 09927)

Employers in this industry are engaged in the chemical treatment and disposal of water in sump pits located on

oil and gas well drilling sites.
It should be noted that employers who pump water to the drilling rig, from a nearby water source, by means of pumps and irrigation piping are also classified in this industry. The equipment used is the same as that of employers pumping water out of a sump pit, and it is part and parcel of the water system used in the drilling process.

Samples of the sump water are analysed by independent laboratories to determine what treatment program may be implemented so as to separate the solid wastes from the liquid, and to make the liquid safe for return to the environment. The treatment program must be approved by the Energy Resources Conservation Board prior to its implementation. Once the waste treatment company has applied the recommended program, they must then send in a sample of the treated sump liquid to the E.R.C.B., who must verify that the treatment was successful. Once approved, the water is pumped out of the sump pit into the surrounding environment.

The solid wastes are often not harmful to the environment, and therefore left in the sump pit. Some employers will use a mechanical system (referred to as a centrifuge) through which they pump the sump pit waste in order to separate the solids from the liquids. Chemicals required to remove any impurities from the water are added to the system. The same E.R.C.B. standards discussed above must be adhered to.

Sub-Sector # 6: Tar Sands

i. Mining & Processing of Bituminous Sands for Oil Extraction (Industry # 06600)

The industry covers employers engaged in both the mining and the processing of bituminous sands which at this time is exclusive to the Athabasca oil sands deposits.

This is an open pit mining process that removes oil laden sand from the earth and transport this sand to an extraction plant.

Draglines with booms measuring over 100 metres, are equipped with enormous buckets that dig up the oil sand. Bucket wheel excavators, equipped with a series of toothed bucket on a revolving wheel, are used to scoop up the sand and put it on conveyors or loaded onto specialized trucks for transport to an extraction plant. Bitumen is then separated from the sand, in the plant, by a series of automated units using steam and chemical agents. Once the raw bitumen is separated, it is upgraded into synthetic crude oil because it contains impurities, and its too thick and heavy to flow through pipelines.

Upgrading units include the coker, which breaks down the bitumen into smaller molecules and the fractionator, which separates the bitumen products into gas, naphtha and gas-oil molecules, removing the impurities. Upgrading plants are comparable to oil refineries in many ways. The end product, synthetic crude oil, is shipped to refineries for further processing into other products such as gasoline, jet fuel and lubricating oil.

ii. Research & Development, Oil Sands & Heavy Oil Recovery (Industry # 06601)

Employers in this industry specialize in research and development into new technologies for recovering oil from heavy oil deposits and bituminous sand through 'in situ' or 'well' recovery methods.

Employers will design and operate test facilities for the research and development purpose. This is purely a research industry and is not intended for exploration or commercial processing activities. Once employers begin operating on a commercial basis, the operation would be classified in industry 06300.

Contract operators may be engaged to operate test facilities and would be classified along with other upstream production operators in industry 06305.

Sub-Sector # 7: Oil/Gas Exploration/ Development- Upstream Operations

Oil & Gas Exploration & Development-upstream operations (Industry # 06300)

This industry covers all 'upstream' oil field activities of employers which generate revenue from the production and sale of crude oil and/or natural gas. This includes both the small independent producer and major integrated oil and gas companies.

Oil and gas companies direct/control/evaluate/supervise oil and gas exploration and development; however, they subcontract the actual field operations prior to the production stage (i.e. seismic, drilling). In effect, they are general contractors for this phase of the industry.

The operation of all upstream production/processing facilities are covered under this classification when conducted by the owner/producer.

Oil or gas marketing firms, companies which are not producers but purchase product from other producers and resell, are considered part of this industry. They take title to the product and generate revenue from the sale of crude oil or natural gas.
Large oil companies may become involved in all aspect of oil exploration, processing and sale. Smaller companies may become involved only in the production and/or sale. Other companies may become involved in oil exploration purely on a speculative basis. All such employers are covered under this industry.

Upstream production facilities include:
- oil/gas well, well head equipment
- flow lines/gathering systems tied into field processing facilities
- battery sites/compressors stations
- crude oil separators and natural gas dehydrators/treaters
- natural gas/sulfur processing plants
- heavy oil projects including steam generation
- other enhanced recovery methods

Gas processing plants are normally located in the vicinity of the producing fields, and are tied directly into gas well through a network of gathering systems. This is considered to be an upstream production activity by the industry and is a common activity of major producers. Gas plants incorporate process technology, similar to refineries and petrochemical plants, for the purpose of removing impurities such as sulfur and water prior to transmission to the market.

Sub-Sector # 8: Oilfield Trucking Services

Oilfield Trucking Services (Industry # 50720)
This industry describes businesses that operate for-hire trucking equipment for the purpose or ability to transport oversized or overweight loads, off-highway loads, in the oilfield. Services in this industry include for-hire specialized trucking services to and from oil and gas lease sites, not described under Specialized Hauling (industry 50701), or bulk or tank truck hauling (industry 50714). Businesses may own or lease trucks, vehicles and equipment and shipping/receiving facilities or terminals. Business may opt to subcontract lease operators to provide trucking/delivery services, while only conducting scheduling, dispatching, and billing services in-house.

As most oil and gas lease sites are located in remote areas, vehicles are typically modified to operate in an off-road environment. Vehicles are usually equipped with positive air shut-offs. These attachments prevent engines from running once turned off, particularly in areas of highly combustible/explosive gases. The industry includes rig moving and operating pilot cars, and businesses in this industry may provide some highway hauling services using standard flatdecks and trucks in the course of a move.

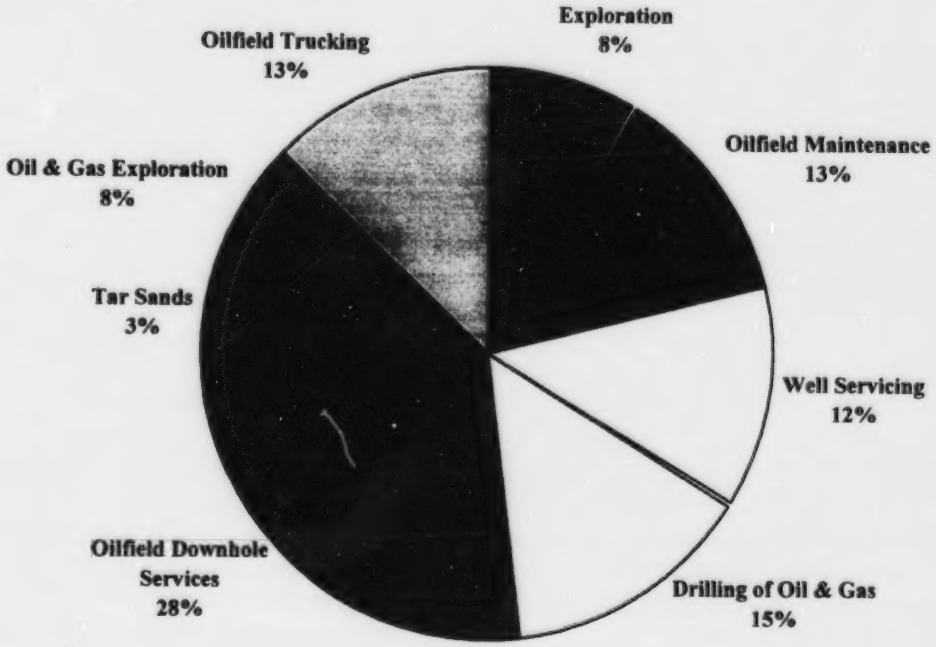
Business may utilize specialized trucking equipment with tire chains, skid plates, heavy-duty bumpers, winches, cherry pickers and may employ drivers, labourers (swampers), warehouse/yard staff, forklift drivers, mechanics, dispatch/traffic, sales/estimators, office/administrative staff.

3. Lost-Time Claim (LTC) and Duration Rates

All Upstream Oil & Gas Industries

Year	# of Accounts	Cost	Person Years	Days Lost	Duration Rate	LTCs	LTC Rate
1995	5,160	$11,077,692	70,766	53,984	76	1,236	1.8
1996	5,645	$9,364,951	72,485	54,843	76	1,303	1.8
1997	6,650	$12,696,143	80,484	66,661	83	1,645	2.0
1998	7,205	$11,476,578	82,714	61,219	74	1,281	1.6
1999	7,652	$7,047,271	74,016	50,429	68	1,111	1.5

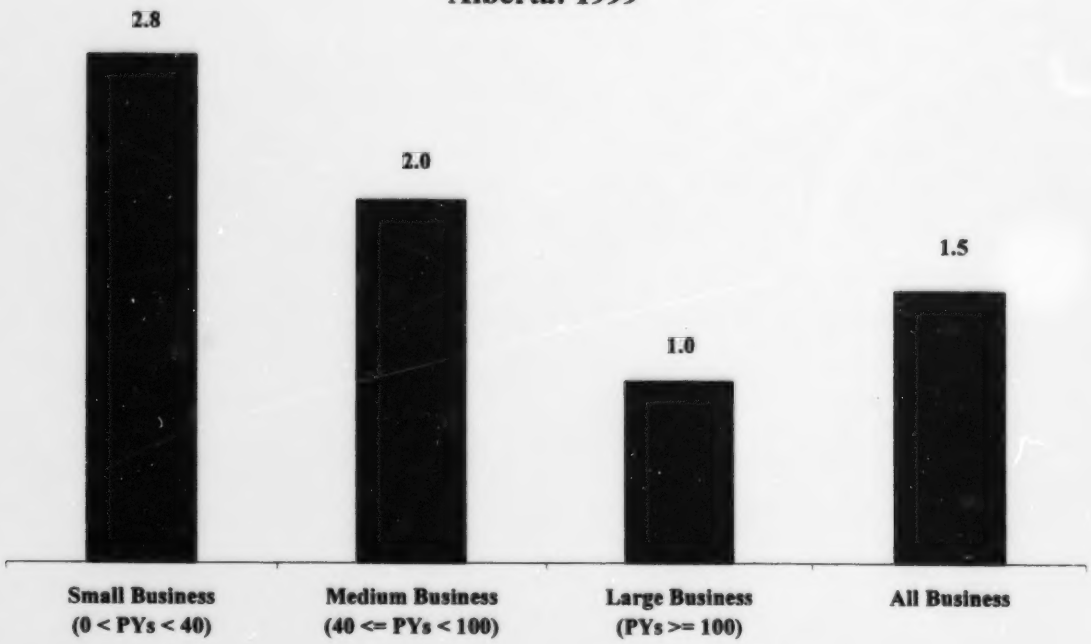
Lost-TimeClaims by Sub-Sectors in The Upstream Oil/Gas Industries Alberta: 1995-1999



3.1 LTC Rates by Size[1] of Employer: 1999

Size of Employer	# of Accounts	LTCs	Person - Years	LTC Rate
A: 0< PYs <=1	4,184	51	2,197	2.3
B: 1 < PYs < 5	2,033	90	3,962	2.3
C: 5 <= PYs < 10	346	75	2,353	3.2
D: 10 <= PYs < 20	268	112	3,739	3.0
E: 20 <= PYs < 40	170	139	4,725	2.9
F: 40 <= PYs < 100	117	154	7,671	2.0
G: PYs >=100	122	486	49,368	1.0
H: Invalid	412	4	0	N/A
Total	7,652	1,111	74,016	1.5

LTC Rate By Size of Employer
Alberta: 1999



[1] Size is measured in terms of estimated person-years (PYs)

3.2 Lost-Time Claim Rates by Sub-Sector

Sub-Sector 1-Exploration

Year	# of Accounts	Cost	Person Years	Days Lost	Duration Rate	LTCs	LTC Rate
1995	217	$1,298,580	2,531	7,349	290	151	6.0
1996	222	$808,650	2,605	5,097	196	117	4.5
1997	221	$640,472	2,880	5,898	205	122	4.2
1998	228	$532,225	2,711	3,967	146	80	3.0
1999	230	$256,120	2,224	4,784	215	74	3.3

Sub-Sector 2-Oilfield Maintenance

Year	# of Accounts	Cost	Person Years	Days Lost	Duration Rate	LTCs	LTC Rate
1995	760	$847,724	3,495	5,962	171	155	4.4
1996	778	$1,164,171	4,019	5,874	146	161	4.0
1997	858	$1,871,160	5,264	8,100	154	225	4.3
1998	901	$903,554	4,839	6,575	136	168	3.5
1999	920	$527,283	4,193	6,577	157	138	3.3

Sub-Sector 3-Well Servicing by Means of Services Rigs

Year	# of Accounts	Cost	Person Years	Days Lost	Duration Rate	LTCs	LTC Rate
1995	113	$2,784,272	3,543	8,137	230	166	4.7
1996	116	$1,418,965	4,293	8,832	206	146	3.4
1997	125	$1,543,160	5,055	10,254	203	211	4.2
1998	112	$1,991,375	4,886	9,264	190	158	3.2
1999	123	$1,112,458	4,197	6,448	154	137	3.3

Sub-Sector 4-Drilling of Oil & Gas Wells

Year	# of Accounts	Cost	Person Years	Days Lost	Duration Rate	LTCs	LTC Rate
1995	61	$1,618,023	4,876	9,831	202	175	3.6
1996	66	$1,986,527	5,700	10,747	189	197	3.5
1997	79	$2,661,066	6,871	13,995	204	289	4.2
1998	81	$2,221,502	6,077	11,475	189	182	3.0
1999	83	$1,336,103	5,137	7,899	154	133	2.6

Sub-Sector 5-Oilfield Downhole Services

Year	# of Accounts	Cost	Person Years	Days Lost	Duration Rate	LTCs	LTC Rate
1995	1,914	$2,662,758	12,528	11,259	90	277	2.2
1996	2,139	$2,253,290	14,151	14,252	101	366	2.6
1997	2,590	$2,652,673	17,275	14,949	87	438	2.5
1998	2,942	$3,959,219	17,374	19,077	110	388	2.2
1999	3,205	$2,210,463	16,304	13,733	84	343	2.1

Sub-Sector 6-Tar Sands

Year	# of Accounts	Cost	Person Years	Days Lost	Duration Rate	LTCs	LTC Rate
1995	12	$270,824	6,975	519	7	37	0.5
1996	11	$132,309	6,051	539	9	54	0.9
1997	11	$145,657	6,025	702	12	35	0.6
1998	14	$52,662	6,921	306	N/A	26	0.4
1999	16	$99,510	6,978	562	8	32	0.5

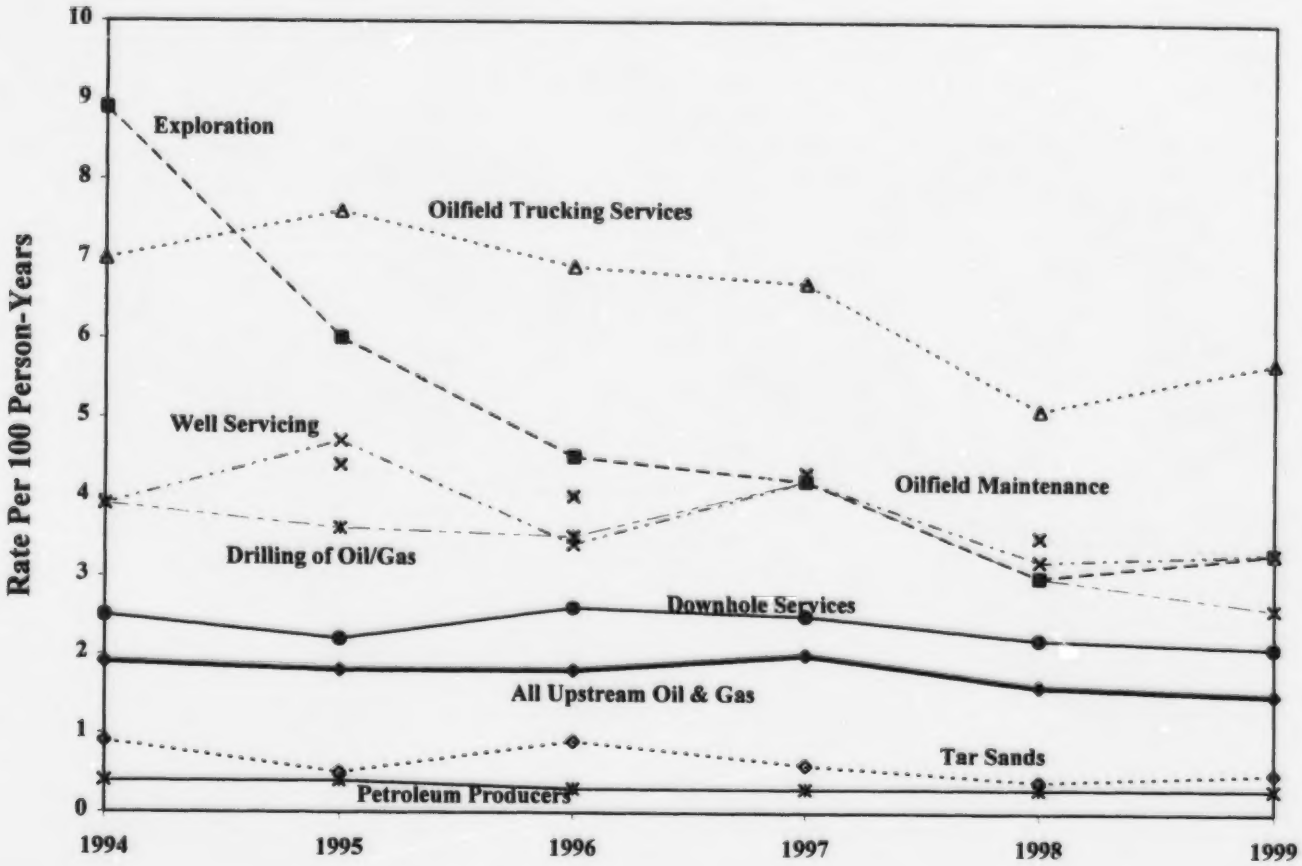
Sub-Sector 7-Oil/Gas Exploration & Development-Upstream Operations

Year	# of Accounts	Cost	Person Years	Days Lost	Duration Rate	LTCs	LTC Rate
1995	1,647	$792,146	34,980	3,085	9	136	0.4
1996	1,831	$673,641	33,410	1,890	6	107	0.3
1997	2,179	$1,810,837	33,765	3,430	10	100	0.3
1998	2,274	$643,090	36,596	2,788	8	111	0.3
1999	2,418	$659,516	32,275	2,736	8	101	0.3

Sub-Sector 8-Oilfield Trucking Services

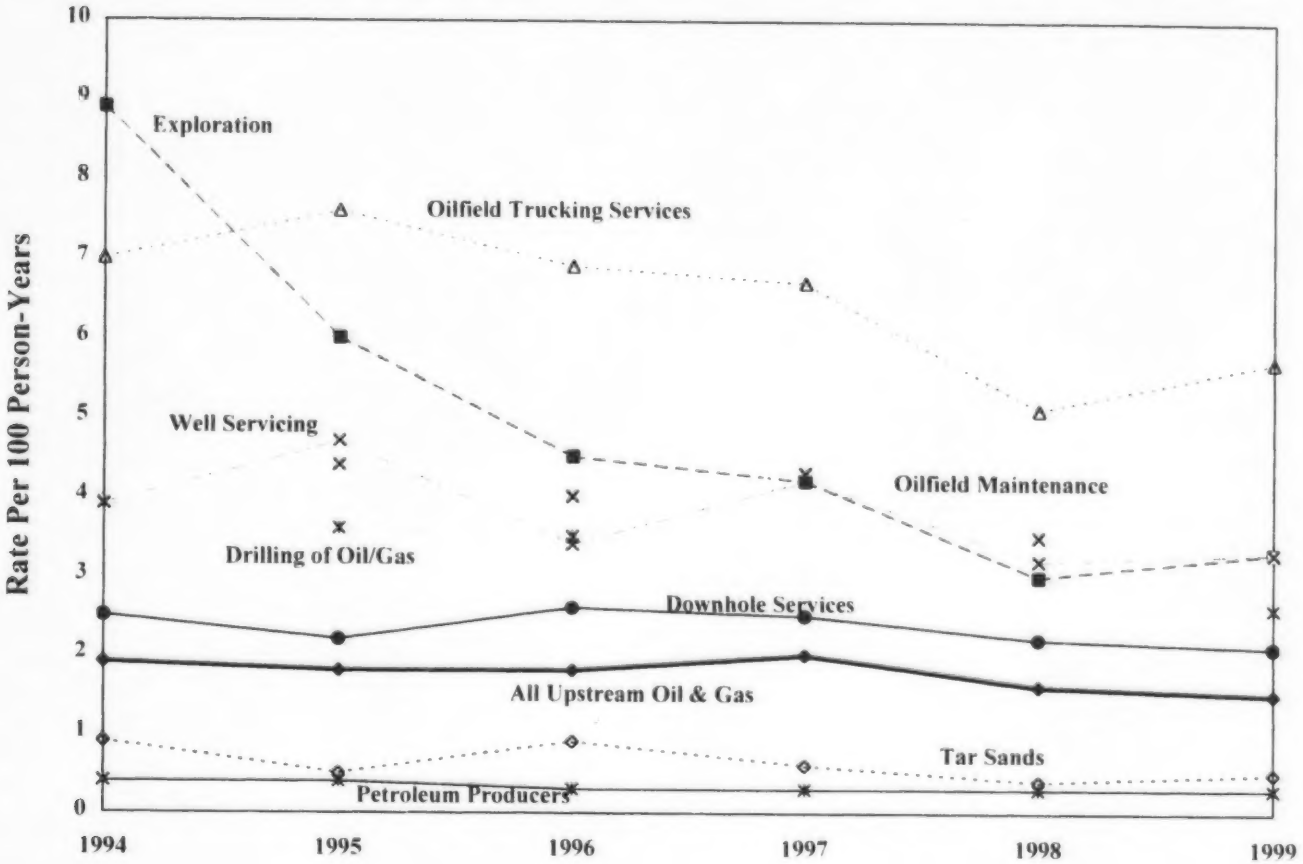
Year	# of Accounts	Cost	Person Years	Days Lost	Duration Rate	LTCs	LTC Rate
1995	436	$803,365	1,638	7,842	427	139	7.6
1996	482	$927,398	2,255	7,612	337	155	6.9
1997	587	$1,371,117	3,348	9,333	279	225	6.7
1998	653	$1,172,951	3,310	7,767	235	168	5.1
1999	657	$845,818	2,707	7,690	284	153	5.7

Lost-Time Claim Rates
Upstream Oil & Gas Subsectors
Alberta: 1994-1999



Lost-Time Claim Rate	1994	1995	1996	1997	1998	1999
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Exploration	8.9	6.0	4.5	4.2	3.0	3.3
Oilfield Maintenance and Construction	3.9	4.4	4.0	4.3	3.5	3.3
Well Services with Service Rigs	3.9	4.7	3.4	4.2	3.2	3.3
Drilling of Oil and Gas	3.9	3.6	3.5	4.2	3.0	2.6
Downhole & Other Oilfield Services	2.5	2.2	2.6	2.5	2.2	2.1
Tar Sands	0.9	0.5	0.9	0.6	0.4	0.5
Petroleum Producers	0.4	0.4	0.3	0.3	0.3	0.3
Oilfield Trucking Services	7.0	7.6	6.9	6.7	5.1	5.7

Lost-Time Claim Rates
Upstream Oil & Gas Subsectors
Alberta: 1994-1999



Lost-Time Claim Rate	1994	1995	1996	1997	1998	1999
All Upstream Oil and Gas	1.9	1.8	1.8	2.0	1.6	1.5
Exploration	8.9	6.0	4.5	4.2	3.0	3.3
Oilfield Maintenance and Construction	3.9	4.4	4.0	4.3	3.5	3.3
Well Services with Service Rigs	3.9	4.7	3.4	4.2	3.2	3.3
Drilling of Oil and Gas	3.9	3.6	3.5	4.2	3.0	2.6
Downhole & Other Oilfield Services	2.5	2.2	2.6	2.5	2.2	2.1
Tar Sands	0.9	0.5	0.9	0.6	0.4	0.5
Petroleum Producers	0.4	0.4	0.3	0.3	0.3	0.3
Oilfield Trucking Services	7.0	7.6	6.9	6.7	5.1	5.7

4. Analysis of the Lost-Time Claims

4.1 Nature of Injury

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
SPRAIN, STRAIN, TEARS	419	404	593	446	373	2,235	34.0
FRACTURE, DISLOCATION	214	258	356	274	218	1,320	20.1
SURFACE WOUNDS, BRUISES	195	165	204	135	121	820	12.5
OTHER TRAUMATIC INJURIES/DISEASE	87	145	146	134	156	668	10.2
OPEN WOUNDS	96	81	134	105	72	488	7.4
SYSTEMIC DISEASES, DISORDERS	82	78	78	72	50	360	5.5
BURNS	58	64	52	69	50	293	4.5
NATURE-UNKNOWN	72	75	57	32	53	289	4.4
OTHER DISEASE,CONDITIONS,DISORDERS	1	2	2	1	4	10	0.2
INFECTIOUS, PARASITIC DISEASE	12	.	.	.	.	12	0.2
SYMPTOMS, SIGN/ILL-DEFINED CONDITIONS	.	4	2	2	2	10	0.2
MULTIPLE DISEASE, DISORDERS	.	26	20	11	12	69	1.0
TUMORS, CANCERS	.	1	1	.	.	2	0.0
Total	1,236	1,303	1,645	1,281	1,111	6,576	100.0

4.2 Part of Body Injured

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
BACK	261	310	383	275	237	1,466	22.3
OTHER TRUNK	145	137	200	147	148	777	11.8
ANKLE(S) & FOOT(FEET)-NOT TOES	127	160	194	147	132	760	11.6
LEG(S)	134	151	173	137	120	715	10.9
FINGER(S)	131	113	162	149	99	654	9.9
WRIST(S)/HAND(S)	101	92	114	102	59	468	7.1
OTHER HEAD	77	85	111	89	56	418	6.4
MULTIPLE BODY PARTS	65	76	85	65	115	406	6.2
OTHER UPPER EXTREMITIES	71	64	81	62	64	342	5.2
EYE(S)	47	39	46	38	32	202	3.1
NECK	45	36	51	36	19	187	2.8
OTHER LOWER EXTREMITIES	17	25	29	21	19	111	1.7
BODY SYSTEMS	13	7	9	7	5	41	0.6
UNKNOWN	2	7	7	6	4	26	0.4
OTHER BODY PARTS	.	1	.	.	2	3	0.0
Total	1,236	1,303	1,645	1,281	1,111	6,576	100.0

4.3 Source of Injury

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
PARTS AND MATERIALS	199	229	323	223	210	1,184	18.0
STRUCTURES/SURFACES	140	146	236	166	152	840	12.8
VEHICLES	147	142	196	139	128	752	11.4
PERSONS-INJURED WORKER	141	149	157	133	130	710	10.8
CONTAINERS	55	52	76	69	50	302	4.6
HANDTOOLS-UNPOWERED	52	55	75	69	48	299	4.5
MACHINERY	43	47	82	68	42	282	4.3
CHEMICAL/CHEMICAL PRODUCTS	25	28	40	33	17	143	2.2
OTHER TOOLS/EQUIPMENTS	2	14	52	32	23	123	1.9
HANDTOOLS-POWERED	12	11	16	10	7	56	0.9
OTHER PLANTS/ANIMALS/MINERALS	23	5	10	11	9	58	0.9
FURNITURE AND FIXTURES	6	12	15	4	7	44	0.7
MINERALS-METALSL/NONMETALLIC	7	7	13	11	3	41	0.6
PERSONS-OTHER THAN INJURED WORKER	3	4	3	6	3	19	0.3
OTHER SOURCES	116	90	50	74	67	397	6.0
UNKNOWN	265	312	301	233	215	1,326	20.2
Total	1,236	1,303	1,645	1,281	1,111	6,576	100.0

4.4 Type of Event/Exposure

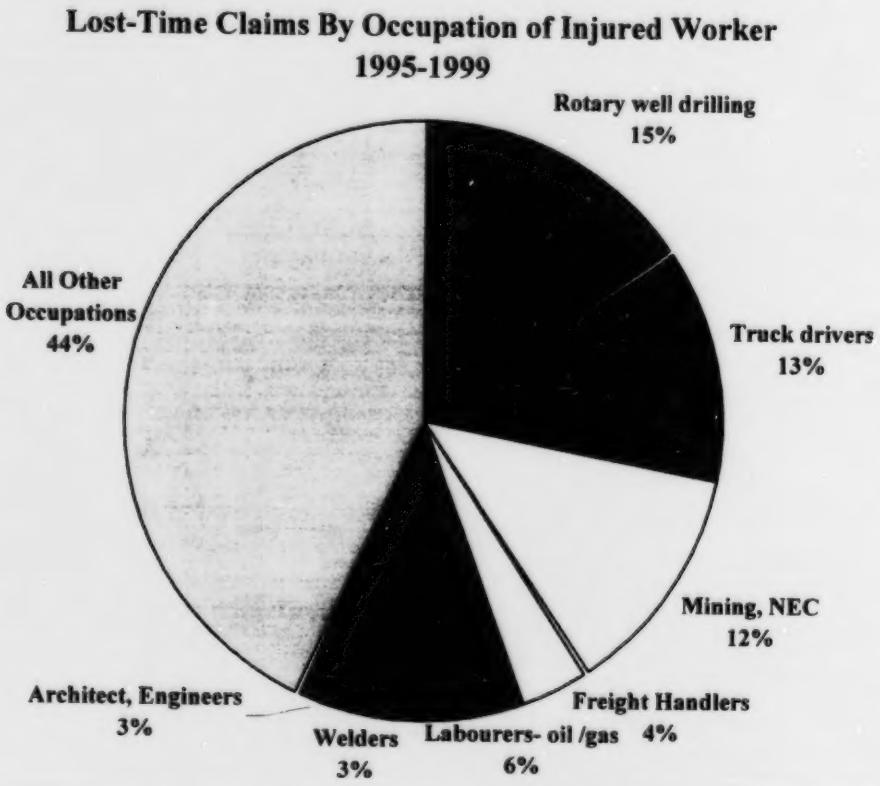
LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
STRUCK BY OBJECTS	200	195	297	214	167	1,073	16.3
OVEREXERTION	183	187	271	220	186	1,047	15.9
CAUGHT IN OBJECTS	125	120	186	144	98	673	10.2
BODILY REACTION	143	133	137	112	108	633	9.6
TRANSPORTATION ACCIDENTS	113	120	159	106	106	604	9.2
FALL TO LOWER LEVEL	89	90	147	113	79	518	7.9
FALL ON SAME LEVEL	90	90	109	86	97	472	7.2
EXPOSURE TO HARMFUL SUBSATANCE	106	90	78	90	56	420	6.4
STRUCK AGAINST OBJECTS	29	38	47	38	31	183	2.8
OTHER FALLS	.	26	40	27	27	120	1.8
RUBBED OR ABRADED	24	17	18	13	16	88	1.3
FIRES AND EXPLOSIONS	8	16	12	15	17	68	1.0
REPETITIVE MOTIONS	.	15	18	15	20	68	1.0
OTHER BODILY REACTION/EXERTION	.	3	5	9	8	25	0.4
OTHER ASSAULTS/VIOLENT ACTS	1	.	3	1	.	5	0.1
ASSAULTS/VIOLENT ACTS BY PERSONS	.	3	2	3	1	9	0.1
OTHER CONTACT WITH OBJECT/EQUIP	.	.	3	9	2	14	0.2
UNKNOWN	125	160	113	66	92	556	8.5
Total	1,236	1,303	1,645	1,281	1,111	6,576	100.0

4.5 Duration of Disability

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
A: 01 Day	66	77	108	77	54	382	5.8
B: 02 Days	58	63	95	67	61	344	5.2
C: 03 - 05 Days	129	138	190	143	112	712	10.8
D: 06 - 10 Days	156	142	218	151	129	796	12.1
E: 11 - 20 Days	182	180	200	164	146	872	13.3
F: 21 - 30 Days	112	122	129	97	95	555	8.4
G: 31 Days OR More	459	494	590	487	426	2,456	37.3
H: Unspecified	74	87	115	95	88	459	7.0
Total	1,236	1,303	1,645	1,281	1,111	6,576	100.0

5. Characteristics of the Injured Worker

5.1 Occupation[2] of Injured Worker



[2] None of the individual occupations belonging to the 'all other occupations' category accounted for more than 2.5% of the total time-loss claims.

5.2 Age of injured Worker

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
A: 15 - 19 Years	81	68	118	72	46	385	5.9
B: 20 - 24 Years	257	239	356	265	246	1,363	20.7
C: 25 - 34 Years	490	506	572	448	354	2,370	36.0
D: 35 - 44 Years	269	338	434	332	299	1,672	25.4
E: 45 - 54 Years	93	112	118	116	122	561	8.5
F: 55+ Years	37	39	44	48	43	211	3.2
G: Unspecified	9	1	3	.	1	14	0.2
Total	1,236	1,303	1,645	1,281	1,111	6,576	100.0

5.3 Length of Time Employed

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
A: LESS THAN 1 MONTH	193	171	269	143	123	899	13.7
B: 1 MONTH TO < 6 MONTHS	305	259	411	279	208	1,462	22.2
C: 6 MONTHS TO < 1 YEAR	169	118	158	152	80	677	10.3
D: 1 YEAR OR MORE	388	393	397	337	373	1,888	28.7
E: TIME UNSPECIFIED	181	362	410	370	327	1,650	25.1
Total	1,236	1,303	1,645	1,281	1,111	6,576	100.0

5.4 Gender of Injured Worker

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
MALES	1,176	1,244	1,582	1,218	1,060	6,280	95.5
FEMALES	45	34	34	47	36	196	3.0
UNSPECIFIED	15	25	29	16	15	100	1.5
Total	1,236	1,303	1,645	1,281	1,111	6,576	100.0

6. Cost of Claims and Premiums

All Upstream Oil & Gas Industries

	OCCURRENCE YEAR				
	1995	1996	1997	1998	1999
TRANSACTION YEAR					
1995	$8,121,994				
1996	$4,198,068	$7,814,733			
1997	$1,636,169	$4,888,766	$9,731,174		
1998	$2,808,924	$4,519,881	$6,825,578	$9,118,066	
1999	$1,868,396	$3,966,384	$6,080,446	$7,148,487	$7,599,160
Total Cost	$18,633,550	$21,189,763	$22,637,197	$16,266,553	$7,599,160
Total Premiums	$50,366,093	$45,972,909	$57,832,087	$37,696,144	$26,926,597

The above cost of claims and premiums are for the five-year period 1995 through to 1999. The data is as at July 6, 2000.

The claim cost reflects only paid cost on lost-time claims that occurred in the five-year period. These cost are tracked by year of occurrence and the year that the costs were transacted.

The premiums are the total premiums paid by employers for each year.

7. Number of Employers that Received/Renewed a COR in 1999

		# Certified	Cert. &Uncert. (# of accounts)	% Certified
SUB-SECTOR # 1:				
Seismic Geophysical Exploration	(Industry # 09200)	3		
Shot Hole Drilling	(Industry # 09201)	7		
Exploration		**10**	**230**	**4.3%**
SUB-SECTOR # 2:				
Oilfield Maintenance & Construction	(Industry # 06304)	**21**	**920**	**2.3%**
SUB-SECTOR # 3:				
Well Servicing with Service Rigs	(Industry # 09903)	**18**	**123**	**14.6%**
SUB-SECTOR # 4:				
Drilling of Oil & Gas Wells	(Industry # 09600)	**7**	**83**	**8.4%**
SUB-SECTOR # 5:				
Field Production Operations	(Industry # 06305)	2		
Vacuum Removal of Waste	(Industry # 06306)	11		
Mud Logging	(Industry # 09900)	0		
Pressure Cleaning Services	(Industry # 09902)	9		
Rathole Drilling/Rig Anchoring	(Industry # 09904)	1		
Downhole Services	(Industry # 09911)	23		
Well Casing Services	(Industry # 09915)	4		
Servicing Christmas Trees	(Industry # 09921)	1		
Liquid Waste Treatment	(Industry # 09927)	0		
Downhole & Other Oilfield Services		**51**	**3,205**	**1.6%**
SUB-SECTOR # 6:				
Mine/Process of Oil Sands	(Industry # 06600)	1		
Oil Sands Research/Development	(Industry #06601)	1		
Tar Sands		**2**	**16**	**12.5%**
SUB-SECTOR # 7:				
Oil/Gas Exploration & Development	(Industry # 06300)	**10**	**2,418**	**0.4%**
SUB-SECTOR # 8:				
Oilfield Trucking Services	(Industry # 50720)	**18**	**657**	**2.7%**
UPSTREAM OIL & GAS SECTOR		**137**	**7,625**	**1.8%**

8. Occupational Fatalities

An occupational fatality is the death of a worker that results from a work-related incident or exposure. Alberta Human Resources and Employment classifies occupational fatalities into three general types: motor vehicle incident, workplace incident and occupational diseases. Each is described in detail below.

Motor Vehicle Incident

Motor vehicle incidents typically involve highway vehicles operating on public roads in which the fatally injured worker was either the driver or a passenger. This category also includes fatalities involving aircraft crashes, train crashes, helicopter crashes, etc.

Workplace Incident

Fatal workplace incidents consist of cases in which the worker dies at a work site, or as a result of injuries sustained at a work site. It is this type of fatality that Alberta Human Resources and Employment may be responsible for investigating.

Occupational Diseases

Occupational disease fatalities consist mostly of recognized occupational disease, that is, disease known to be primarily or exclusively work-related (e.g. asbestosis, black lung disease). Occupational diseases are frequently diagnosed many years after the initial or crucial exposure to the toxic substance, and in such cases it is very difficult to determine when the fatal exposure occurred. Thus, the occupational disease category should not be interpreted to reflect present work site hazardous conditions or exposures.

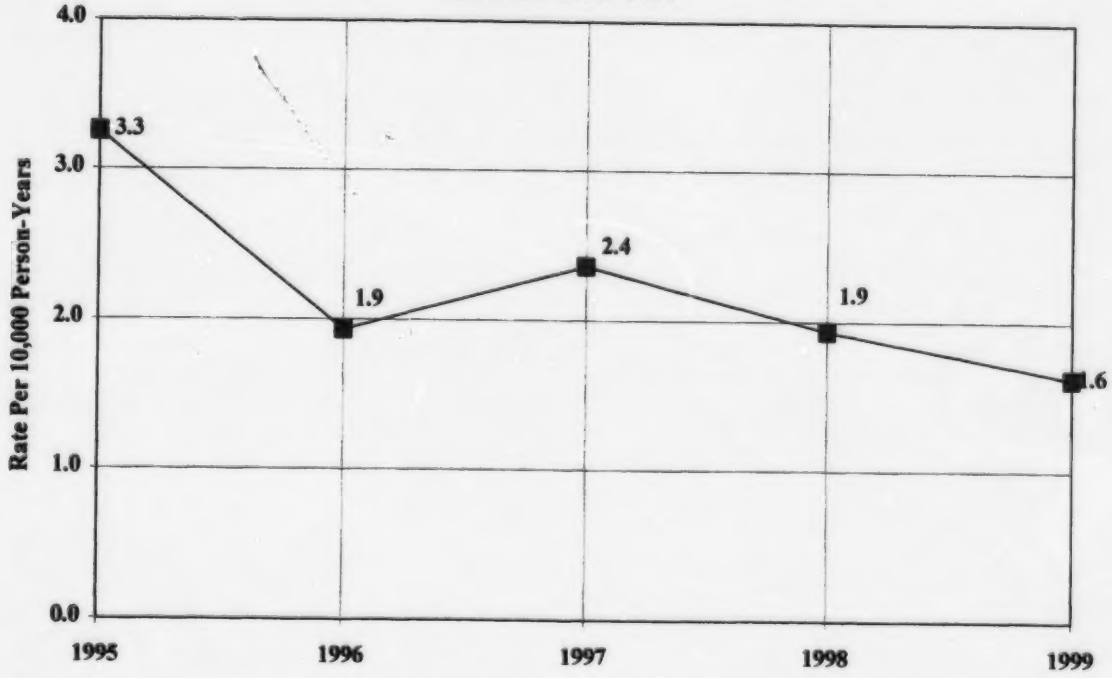
Each year the Workers' Compensation Board (WCB) accepts some occupational fatality claims for compensation. Occupational fatality claims that were accepted in a particular year may include fatalities from prior years.

Fatality rates are estimated by dividing the number of accepted fatalities in the year by the number of estimated person-years in that year. The result is expressed as 'per 10,000 person-years worked'.

Description of Upstream Oil & Gas Workplace Fatalities Accepted by the WCB Alberta: 1995-1999

Year	Occupational Disease		Motor Vehicle incident		Workplace Incident		Total	
	N	%	N	%	N	%	N	%
1995	1	4.3	15	65.2	7	30.4	23	100
1996	0	0.0	8	57.1	6	42.9	14	100
1997	1	5.3	14	73.7	4	21.1	19	100
1998	2	12.5	8	50.0	6	37.5	16	100
1999	1	8.3	6	50.0	5	41.7	12	100
Total	5	6.0	51	60.7	28	33.3	84	100

Fatality Rates in Upstream Oil & Gas Industries Alberta: 1995-1999



9. Description of Workplace Fatalities Investigated by OHS: 1995-1999

Sub-Sector 1: Exploration (0)

Sub-Sector 2: Oilfield Maintenance and Construction (1)

YEAR:	1998	FILE:	0891
OCCUPATION:	Apprentice Welder	AGE:	24
INDUSTRY:	Oil Field Construction and/or Maintenance (Upstream of Processing Plants)		
EXPERIENCE:	1.5 years		

DESCRIPTION: A three person crew was in the process of cutting steel pilings for the installation of an above ground pipeline at the Primrose Lake construction site. The piles had been driven into place in pairs. The piles at the incident scene were long, so a backhoe was required to hold the piles while they were being cut. One of the poles had been cut and pulled down. They were setting up to cut the second pile when the welder appeared in front of the piling just as the backhoe bucket was swinging back to hold the pile. The welder was hit on the right side of his head with the bucket of the backhoe resulting in fatal injures.

Sub-Sector 3: Well Services With Service Rigs and Power Swivels (6)

YEAR:	1995	FILE:	0811
OCCUPATION:	Roughneck	AGE:	20
INDUSTRY:	Well Servicing with Service Rigs		
EXPERIENCE:	4 months		

DESCRIPTION: At a recently drilled gas well, the service rig workers were in the final stages of well completion, which was to remove the blow out prevention unit (BOP) and prepare installation of the master valve. When the hoist line was raised, the sling tightened up against the pipe nipple and pulled the pipe nipple out of the THS. The pressure in the well head propelled the pipe nipple away from the THS and struck the worker who was in the path of travel.

YEAR:	1995	FILE:	0826
OCCUPATION:	Rig Repairer	AGE:	25
INDUSTRY:	Servicing of Gas and Oil Wells by means of Service Rigs		
EXPERIENCE:			

DESCRIPTION: A well servicing company was contracted by an oil company to rework a well that had been shut-in for six months. The crew prepared the rig matting and the rig was centered over the well. When the rig up was completed, reverse circulation (pumping down casing) was tried and was unsuccessful due to wax build up. The crew decided to back off the rod string by using two 0.91 m. pipe wrenches across from each other on the polish rod clamp. There were two workers on each wrench, one pulling and the other pushing. About 10 to 15 anti-clockwise turns of torque were applied to the rod string. Control on the wrenches was lost and one of the wrenches flung around clockwise fatally injuring one worker and knocking the second worker unconscious.

YEAR:	1996	FILE:	0848
OCCUPATION:	Roughneck	AGE:	24
INDUSTRY:	Well Servicing with Service Rigs		
EXPERIENCE:	1.75 years		

DESCRIPTION: A service rig crew was swabbing the contents of an oil well. The work was being performed as a part of a completion program to bring the well into production. The oil company had contacted the consultant in charge of the job site and asked that swabbing be stopped. They asked that a sample of the produced fluids be taken and that tubing be removed from the well so they could seal off the zone producing water. The roughneck took a sample of the produced fluids at the rig tank entry hatch and was later seen standing between the rig tank and the rig pump. The rest of the crew removed the swabbing equipment from the service rig. It is unknown why or when, but the roughneck who took the sample returned and entered the rig tank. As the crew were pulling the tubing, the rig manager found the roughneck who had taken the sample floating in the produced fluids in the tank. The roughneck was rescued by the crew and given two man CPR until they were relieved by ambulance attendants. He was transported to the hospital where he was pronounced dead from drowning.

YEAR:	1998	FILE:	0887
OCCUPATION:	Derrickman	AGE:	33
INDUSTRY:	Servicing of Gas and Oil Wells by Means of Service Rigs		
EXPERIENCE:	Unknown		

DESCRIPTION: The worker was in the process of rigging out the tubing board of a service rig. He had connected his fall arrest line and disconnected his positioning lanyard. The fingers on the tubing board had been spread apart and the worker was standing on the diving board. As he turned, the worker slipped and fell through the hole left by the fingers. The worker fell approximately 4 metres until the fall arrest cable tightened. When the cable tightened it separated and the worker fell to the ground. The worker died as a result of injuries sustained in the fall.

YEAR:	1998	FILE:	0888
OCCUPATION:	Derrickhand	AGE:	26
INDUSTRY:	Servicing of Gas and Oil Wells		
EXPERIENCE:	4 years		

DESCRIPTION: A service rig crew was inserting the last joint of pipe into a well. The derrickhand was working on the tubing board, wearing a harness attached to a 1.8 m (6 feet) working lanyard, anchored to the tubing board rail. After the derrickhand positioned the joint of pipe, the operator instructed him to "rig out" the tubing board (in preparation to dismantle the rig).

In the process of rigging out, the derrickhand transferred from his working lanyard to the retractable life line, used for going up and down the derrick ladder. The retractable life line was anchored to the crown of the derrick, above the ladder. He was working on the tubing board, therefore the retractable life line was across the path of the travelling blocks.

The blocks were still in motion and caught the retractable lifeline, pulling the derrickhand off the tubing board. The blocks sheared the line and he fell to the ground and sustained fatal injuries.

YEAR:	1999	FILE:	0923
OCCUPATION:	Operations Manager	AGE:	49
INDUSTRY:	Servicing of Gas and Oil Wells by means of Service Rigs		
EXPERIENCE:	23 years in Oilwell Servicing		

DESCRIPTION: An old oilfield pump truck was brought into the company's head office yard for servicing. The Operations Manager asked the worker to back the truck over to a skid mounted pump in the middle of the yard. The Operations Manager wanted to move the skid mounted pump over approximately two metres to the west.

The Operations Manager stood between the truck and the skid in preparation of wrapping the truck's winch cable around the skid. The worker climbed onto the deck of the truck to operate the winch from the auxiliary control panel. The Operations Manager instructed the worker to increase the throttle to speed up the winch as the cable was reeling out too slow. As soon as the throttle was increased, the truck accelerated backward pinning the Operations Manager between the pump skid and the truck and fatally injuring him.

Sub-Sector 4: Drilling of Oil and Gas Wells (7)

YEAR:	1995	FILE:	0803
OCCUPATION:	Derrickman	AGE:	39
INDUSTRY:	Drilling of Oil and Gas		
EXPERIENCE:	21 years		

DESCRIPTION: A worker was fatally injured as a result of a derrick collapse on a drilling rig at a well lease. The worker had just climbed to the crown of the derrick to assist with setting up the structure. the two front legs attached to the floor buckled while the two back legs attached to the stools on the drawworks skid bent and snapped off. The derrickman was still attached to a fall arrester at the crown. The worker succumbed to the serious injuries he received from the impact of the fall.

YEAR:	1995	FILE:	0822
OCCUPATION:	Floor Hand	AGE:	33
INDUSTRY:	Drilling of Oil and Gas Wells		
EXPERIENCE:	Unknown		

DESCRIPTION: The drilling crew was in the process of doing a drill stem test and had attempted to inflate the packers, but they would not inflate. The decision was made to rotate the drill string at an increased speed, for an additional 15-20 minutes. During this procedure the floor personnel had been instructed to 'clear the floor' which meant that workers were not be within a specific area of the rig floor.

The crew was approaching the end of a 12 hour shift, and the normal duties performed by the crew in the last hour of the shift is to clean the rig and have it ready for the next crew. The injured worker was washing the rig floor using a steam hose. The hose became tangled with the breakout tool cable and the rotating drill string and pulled the worker into the drill string, with the hose and cable being wrapped around the worker as the drill string rotated. The hose and cable continued to tighten as the pipe rotated, crushing the floor hand.

YEAR: 1996
OCCUPATION: Floor hand - Oil Well Drilling
INDUSTRY: Drilling Oil & Gas Wells
EXPERIENCE: 287 hours, total rig experience, 72 hours as a floor hand
FILE: 0846
AGE: 31

DESCRIPTION: A crew was preparing a rig for a move at the time of the incident, by removing and storing pipe from the well. While raising a length of pipe so it could be uncoupled, the break-out tong of the floorhand caught on the pipe, rising along with it. The floor hand was caught by the safety cables and pinned against the structure of the rig, causing fatal injuries.

YEAR: 1996
OCCUPATION: Floor hand - Oil Well Drilling
INDUSTRY: Drilling Oil & Gas Wells
EXPERIENCE: Unspecified
FILE: 0845
AGE: 25

DESCRIPTION: A crew was in the process of drilling a well. In the process of making a connection, adding a length of pipe to the drilling string, the hammer nut on the swivel caught a horizontal beam on the crown stand. This caused the bottom end of the pipe to whip toward the back of the rig floor. The floor hand was unable to move out of the way and was struck in the face and chest, and was thrown about 2.5 metres where his head contacted racked pipe. This resulted in fatal injuries to the floor hand.

YEAR: 1997
OCCUPATION: Floor Hand
INDUSTRY: Drilling of Oil and Gas Wells
EXPERIENCE: Less than one year
FILE: 0862
AGE: 20

DESCRIPTION: The drilling crew was in the process of tripping out drill pipe, when they came to a set of cross over subs. These subs are used to adapt parts of the drilling string which cannot otherwise be screwed together because of the difference in thread size or design. The crew attached the tongs to the collars and sub and applied torque to break open the joint between the two. The Leed tong (tongs are the large wrenches that are latched onto drill pipe or drill collars in order to make up "tighten" or break our "loosen" a joint or drill pipe or drill collars) latch lug jaw failed, broke off, and struck the worker in the head fatally injuring him.

YEAR: 1997
OCCUPATION: Floorhand
INDUSTRY: Drilling of Oil and Gas Wells
EXPERIENCE:
FILE: 0877
AGE: 22

DESCRIPTION: An oil rig crew was finishing the process of laying down an oil rig derrick on two bedtrucks in preparation for the rig move. The worker assisted a gin pole truck operator in rigging the A-leg section of a mast so a spreader bar could be removed and the A-leg lowered. The A-leg was secured to a lifting lug which was attached to a hook and winch line of a gin pole truck. The worker removed a pin that secured a spreader bar to the derrick and then climbed onto the derrick to remove the spreader bar. The worker polled the spreader bar off, lost his balance and fell forward under the suspended A-leg. Simultaneously, the lifting lug used in lowering and raising the A-legs failed. The A-leg fell on the worker, causing fatal injuries.

YEAR: 1999 FILE: 0918
OCCUPATION: Lease Hand AGE: 25
INDUSTRY: Drilling of Oil and Gas Wells
EXPERIENCE: 39 months on rigs / 69 days on Rig #159SL

DESCRIPTION: The worker was resetting the pipe handling system at the drill rig. To facilitate the pipe transfer process, the transfer arm was to be repositioned to the next tier of drill pipes. A drill pipe, left from the previous transferred layer, was resting on the transfer arm. The worker lost control of the transfer arm when he attempted to re-position it. The drill pipe resting on the transfer arm rolled down and struck the worker on the head. The worker died from serious head injuries.

Sub-Sector 5:Downhole and Other Oilfield Services (5)

YEAR: 1995 FILE: 0821
OCCUPATION: Swamper AGE: 18
INDUSTRY: Oilfield Downhole Services
EXPERIENCE: 4 months

DESCRIPTION: The lease owner of the site, had completed the drilling of an oilwell at the location of the incident and had contracted the services of a consultant to arrange for a service rig to come on the site to bring the well into production. The equipment was delivered to the site when the incident occurred. Two workers, a truck driver/picker operator and his helper (swamper) were unloading a set of service rig pipe racks from a flatbed trailer. The driver lowered the picker's outriggers, positioned the boom and lowered the hook to get ready to hook up to the pipe racks. The driver was storing the tie down chains and boomers on the rear of the tractor cab. The swamper climbed up on the flatbed and removed the rear tie down chain on the load. The front tie down chain fell to the ground and the right pipe rack tipped off the load. The swamper tried to grab the rack which was tipping. The right pipe rack (which was attached to the left rack by a chain) fell off the trailer pulling the left rack and the swamper with it. The pipe racks fell and landed on the swamper causing fatal injuries.

YEAR: 1997 FILE: 0872
OCCUPATION: Truck Driver AGE: 33
INDUSTRY: Field Production Operators
EXPERIENCE: one week with company

DESCRIPTION: The driver was employed with the trucking company to haul methanol to gas leases. The driver attempted to enter the gas lease and his truck became stuck. The lease operator radioed for a caterpillar to pull the truck out. The lease operator and the driver unloaded the methanol and the former left to perform other duties. The cat operator arrived and proceeded to unload the cat off the truck and then backed down the road a short distance. He moved the cat forward through a ditch and a grassy area to the front of the methanol truck. As he manoeuvred the cat in front of the truck, he saw a dark form on the grass. Upon checking, he discovered that the truck driver had been run over by the caterpillar.

YEAR:	1998	FILE:	0909
OCCUPATION:	Cement Acid Pumper/Driver	AGE:	29
INDUSTRY:	Oilfield Downhole Services		
EXPERIENCE:	11 months with employer		

DESCRIPTION: A worker was found dead in a trench. The worker was one of the two individuals monitoring a pipeline freeze plug operation. Between 25 and 45 minutes after the worker entered the trench, he was found frozen by the other worker and a relief crew. The reason for the worker entering the trench is not known.

The purpose of the trench was to expose a section of oil pipeline so that it could be tested for leaks. The pipeline was filled with water to prepare for the leak test. Liquid nitrogen was flowing from a nearby bulk truck through a freeze plug jacket surrounding the pipe. The cold liquid nitrogen on the outside of the pipe froze the water inside the pipe, creating a plug of ice. The freeze plug process created an atmosphere cold enough to solidly freeze the soil in the base of the trench.

YEAR:	1999	FILE:	0943
OCCUPATION:	Operations Manager	AGE:	48
INDUSTRY:	Oilfield Downhole Services		
EXPERIENCE:	25 years		
OCCUPATION:	Labourer	AGE:	19
INDUSTRY:	Oilfield Downhole Services		
EXPERIENCE:	3 months		

DESCRIPTION: An Operations Manager and a labourer were welding an overflow pipe on top of a tank that contained residual flammable materials. During the welding operation the welding spark ignited the flammable materials causing the tank to explode. Both the Operations Manager and the labourer received fatal injuries as a result of the explosion.

Sub-Sector 6:Tar Sands (1)

YEAR:	1995	FILE:	0818
OCCUPATION:	Ground Hand	AGE:	31
INDUSTRY:	Mining and Processing of Bituminous Sand for Oil Extraction		
EXPERIENCE:	Unknown		

DESCRIPTION: The replacement groundsman was on the ground helping the cable tractor operator to relocate the dragline's power cable. This routine operation involves moving power cable with the cable tractor, so the walking shoes of the dragline would not step down onto the cable in the walking mode. After relocating the cable, the groundsman was directing the dragline operator to align the shoes in preparation for walking back to the previous location to resume excavation. The groundsman was in a crouched position with his back to and in direct line of travel of the reversing cable tractor. The back-up alarm on the tractor was not working.
The tractor operator was unaware of the presence of the groundsman, and the groundsman did not sense the approaching tractor. The dragline operator tried to warn the groundsman by blowing the dragline horn. He did not succeed in capturing the attention of the groundsman.

The dragline operator then used the radio to get the tractor operator to stop the equipment, but grabbed the wrong transmitter. By the time he had communicated with the tractor operator, the groundsman had been hit and run over by the cable tractor.

Sub-Sector 7: Petroleum Producers (1)

YEAR:	1996	FILE:	0828
OCCUPATION:	Inspection, Maintenance of Measuring Equipment	AGE:	53
INDUSTRY:	Oil & Gas Exploration and Development - Upstream Operations		
EXPERIENCE:	Unknown		

DESCRIPTION: The self-employed contractor was in the process of "Gauging" (manually measuring fluid levels) Sour Crude Oil Storage Tanks through openings at the top of the tanks known as "Thief Hatches." The worker was conducting the measurement from an elevated work platform 13' 2" from the ground level. The elevated work platform had guard-rails and was connected to ground by a stairway with hand-rails. Another worker on site witnessed the self-employed contractor go up to the elevated work platform without respiratory

protective equipment and/or personal monitoring equipment. The worker became exposed to hydrogen sulphide gases while taking fluid level measurements resulting in losing consciousness and falling over the guard-rail of the stair-way to the ground.

Sub-Sector 8: Oilfield Trucking Services (0)

Appendix A: Terms, Definitions, and Formulas

Lost-Time Claim

A lost-time claim (LTC) is a claim for an occupational injury or disease which disables the worker beyond the day of injury. Included are claims for which wages compensation are paid, permanent disability claims, fatalities, and cases in which the injured worker is assigned light duties or other modified work.

Person-Years

Person-year estimates are calculated from wage and payroll data provided by account holders to the WCB. Alberta Labour uses these data to estimate. An average industry wage, and uses the average industry wage and employer payroll data to estimate person-years foe each employer and each industry. One person-year ie equivalent to one full-time worker working for one year, and can be assumed to equal 2,000 hours worked.

LTC Rate

The lost-time claim (LTC) rate is calculated by dividing the number of lost-time claims by the person-year estimate, and multiplying the result by 100. The LTC rate represent the probability or risk of disabling injury or disease to a worker during a period of one year=s work. Comparisons of LTC rates between industries, or between years, can be used to indicate increases, decreases, or differences in this risk.

$$\text{LTC Rate} = \frac{\text{Number of LTCs X 100}}{\text{Estimated Person-years}}$$

Duration (Days Lost)

The duration of disability is the number of days following the injury or disease for which the worker was disabled, and unable to perform normal work duties. This information is obtained for this report from data on compensation days paid on each claim from WCB. Alberta Labour obtains these data on March 31 of the year following the claim year, and does not update the information, even though many injured workers continue to be disabled beyond this date. As a result, the duration information reported here underestimates the true impact of lost-time injury and disease.

Duration Rate

The duration rate is calculated by dividing the number of work days lost (disability days) by the person-year estimate, and multiplying by 100. The result is expressed as "days lost per 100 person-years worked", and indicates, in part, the economic impact of occupational injury and disease. Duration rates are not recommended as reliable indicators of full economic cost. In addition, readers are warned that duration rates are highly unstable when based on only a few lost-time claims; it is recommended that the duration rate not be calculated based upon fewer than 30 lost-time claims.

$$\text{Duration Rate} = \frac{\text{Disability Days X 100}}{\text{Estimated Person-Years}}$$

WCB Accepted Fatality

An occupational fatality is the death of a worker which result from a work-related incident or exposure and which has been accepted by the WCB for compensation. A fatality is counted in the year it is accepted.

NEC

Means "Not Elsewhere Classified"

UNS

Means "Unspecified"

Appendix B: Upstream Oil and Gas 1999 Industry Codes

Sub-Sector 1: **Exploration**
Industries:
09200~Seismic Geophysical/Mineral Exploration
09201~Shot Hole Drilling

Sub-Sector 2: **Oilfield Maintenance and Construction**
Industries:
06304~Oilfield Construction and/or Maintenance

Sub-Sector 3: **Well Servicing With Service Rigs**
Industries:
09903~Well servicing with Service Rigs including Power Swivels

Sub-Sector 4: **Drilling of Oil and gas Wells**
Industries:
09600~Drilling of Oil & Gas Wells

Sub-Sector 5: **Downhole & Other Oilfield Services**
Industries
06305~Field Production Operators
06306~Vacuum Removal of Waste
09900~Mud Logging
09902~Pressure Cleaning Services
09904~Rathole Drilling and Rig Anchoring
09911~Oilfield Downhole Services
09915~Well Casing Services
09921~Servicing Christmas Trees On Oil Wells
09927~Liquid Waste Treatment & Disposal

Sub-Sector 6: **Tar Sands**
Industries:
06600~Mining & Processing of Bituminous Sand
06601~Research/Development, Oil Sands and Heavy Oil Recovery

Sub-Sector 7: **Oil & Gas Exploration/Development**
Industries:
06300~Oil and Gas Exploration & Development-Upstream Operations

Sub-Sector 8: **Oilfield Trucking Services**
Industries:
50720~Oilfield Trucking Services